

**Mass and Related Quantities, Austria, BEV (Bundesamt für Eich- und Vermessungswesen)**

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Mass	Mass standards	Comparison in air	1	100	mg			1.2	µg	2	95%	No	The volume of the mass standards is known	
Mass	Mass standards	Comparison in air	0.1	1	g			1.2 to 2	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1	10	g			2 to 5	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	10	100	g			5 to 12	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	0.1	1	kg			12 to 74	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1	10	kg			74 to 800	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Mass	Mass standards	Comparison in air	10	100	kg			0.8 to 200	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	100	1000	kg			0.2 to 2	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Density of solid	Mass standard 1 kg	Hydrostatic weighing	7900	8100	kg/m <sup>3</sup>	Reference temperature	20 °C	0.16	kg/m <sup>3</sup>	2	95%	No		
Volume of solid	Mass standard 1 kg	Hydrostatic weighing	123	127	cm <sup>3</sup>	Reference temperature	20 °C	2.5	mm <sup>3</sup>	2	95%	No		
Absolute pressure	Digital piston manometer	Gas medium	5.0E+02	5.0E+03	Pa			(0.5 + 4E-05p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.5 Pa to 0.7 Pa	
Absolute pressure	Digital piston manometer	Gas medium	5.0E+03	1.20E+05	Pa			(0.5 + 4E-05p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.7 Pa to 5.3 Pa	
Gauge pressure	Pressure balance	Gas medium	3.5E+03	1.70E+05	Pa			(0.5 + 3E-05p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.6 Pa to 6 Pa	
Gauge pressure	Pressure balance	Gas medium	1.7E+05	4.00E+06	Pa			(0.5 + 4E-05p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 7.3 Pa to 1.6E+02 Pa	
Gauge pressure	Pressure balance	Gas medium	4.00E+06	1.2E+07	Pa			1E-04p, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4E+02 Pa to 1.2E+03 Pa	

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Gauge pressure	Pressure balance	Oil medium	5.00E+05	4.00E+07	Pa			(6 + 4E-05p + 1.2E-13p <sup>2</sup> ), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 26 Pa to 1.8E+03 Pa	
Gauge pressure	Pressure balance	Oil medium	4.00E+07	4.00E+08	Pa			(8E-05p + 2.5E-13p <sup>2</sup> ), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 3.6E+03 Pa to 7.2E+04 Pa	
Force: tension and compression	Force measuring device	Deadweight	0.5	20	kN			0.02	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Lever amplification	10	200	kN			0.05	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Hydraulic amplification	40	1000	kN			0.05	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Hydraulic amplification	0.5	5	MN			0.05	%	2	95%	Yes		
Torque	Torque measuring devices		10	100	Nm	Mode	clockwise, anticlockwise	0.5	Nm	2	95%	No		
Torque	Torque measuring devices		100	350	Nm	Mode	clockwise, anticlockwise	5.0E-03		2	95%	Yes		
Kinematic viscosity	Newtonian liquids	Reference liquid	0.35	19	mm <sup>2</sup> /s	Temperature	20°C	0.35	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account	

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Kinematic viscosity	Newtonian liquids	Reference liquid	20	999	mm <sup>2</sup> /s	Temperature	20°C	0.45	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account	
Kinematic viscosity	Newtonian liquids	Reference liquid	1000	50000	mm <sup>2</sup> /s	Temperature	20°C	0.5	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account	
Kinematic viscosity	Newtonian liquids	Capillary viscometers	0.001	0.05	mm <sup>2</sup> /s <sup>2</sup>	Temperature	20°C	0.4	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account	
Kinematic viscosity	Newtonian liquids	Capillary viscometers	0.1	1	mm <sup>2</sup> /s <sup>2</sup>	Temperature	20°C	0.45	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account	
Kinematic viscosity	Newtonian liquids	Capillary viscometers	3	5	mm <sup>2</sup> /s <sup>2</sup>	Temperature	20°C	0.5	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account	
Kinematic viscosity	Newtonian liquids	Capillary viscometers	10	50	mm <sup>2</sup> /s <sup>2</sup>	Temperature	20°C	0.55	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account	

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Hardness	Hardness block	Rockwell according to ISO 6508:3	According to ISO 6508:1	According to ISO 6508:1	HR	Preliminary test force	98.07 N	0.5	HR	2	95%	No		
						Total test force	588.4 N to 1471 N							
Hardness	Hardness block	Rockwell according to ISO 6508:3	According to ISO 6508:1	According to ISO 6508:1	HR	Preliminary test force	29.42 N	1	HR	2	95%	No		
						Total test force	147.1 N to 441.3 N							
Hardness	Hardness block	Vickers (HV1 to HV100) according to ISO 6507:3	According to ISO 6507:1	According to ISO 6507:1	HV	Test force	9.807 N to 980.7 N	1.5	%	2	95%	Yes		
Hardness	Hardness block	Brinell HB2.5/187.5 according to ISO 6506:3	According to ISO 6506:1	According to ISO 6506:1	HB	Test force	1839 N	2	HB	2	95%	No		
Gravitational acceleration	On (stable) site	Absolute measurement	9.75	9.85	m/s <sup>2</sup>	Ambient temperature	(21 ± 5) °C	1.0E-07	m/s <sup>2</sup>	2	95%	No		
Gas flowing quantity, volume	Volumetric flowmeter	Turbine, rotary, ultrasonic, positive displacement, etc.	0.04	25	m <sup>3</sup> /h	Gas	dry air	0.15	%	2	95%	Yes		AT1
						Temperature	19.5 °C to 22.5 °C							
						Absolute pressure	0.1 MPa							
						Pipe size	DN 10 - DN 50							

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Gas flowing quantity, volume	Volumetric flowmeter	Turbine, rotary, ultrasonic, positive displacement, etc.	0.5	400	m <sup>3</sup> /h	Gas	dry air	0.30	%	2	95%	Yes		AT2
						Temperature	19.5 °C to 22.5 °C							
						Absolute pressure	0.1 MPa							
						Pipe size	DN 50 - DN 150							
Gas flowing quantity, volume	Volumetric flowmeter	Turbine, rotary, ultrasonic, positive displacement, etc.	100	1000	m <sup>3</sup> /h	Gas	dry air	0.30	%	2	95%	Yes		AT3
						Temperature	19.5 °C to 22.5 °C							
						Absolute pressure	0.1 MPa							
						Pipe size	DN 50 - DN 150							
Liquid flowing quantity, volume	Volumetric flowmeter	Electromagnetic, turbine, vortex, ultrasonic, etc., winged wheel type water meter, etc.	6	180000	l/h	Liquid	water	0.05	%	2	95%	Yes		AT4
						Temperature	8 °C to 90 °C							
						Pressure	0.06 MPa to 0.5 MPa							
						Pipe size	DN 10 - DN 150							

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Liquid flowing quantity, volume	Volumetric flowmeter	Electromagnetic, turbine, vortex, ultrasonic, etc., winged wheel type water meter, etc.	2000	600000	l/h	Liquid	water	0.5	%	2	95%	Yes		AT5
						Temperature	20 °C							
						Pressure	0.2 MPa							
						Pipe size	DN 50 - DN 300							
Liquid flowing quantity, volume	Volumetric flowmeter	Electromagnetic, turbine, vortex, ultrasonic, etc., winged wheel type water meter, etc.	6	180000	l/h	Liquid	water	0.07	%	2	95%	Yes		AT6
						Temperature	> 90 °C to 130 °C							
						Pressure	0.06 MPa to 0.5 MPa							
						Pipe size	DN 10 - DN 150							
Liquid flowing quantity, volume	Volumetric flowmeter	Positive displacement, rotary piston, turbine, ultrasonic, vortex meter	0.03	1500	l/min	Liquid	gasoline, gas-oils	0.07	%	2	95%	Yes		AT7
						Temperature	14 °C to 17 °C							
						Pressure	0.05 MPa to 0.6 MPa							
						Pipe size	DN 6 - DN 80							

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Liquid flowing quantity, volume	Volumetric flowmeter	Positive displacement, rotary piston, turbine, ultrasonic, vortex meter	30	1500	l/min	Liquid	gasoline, gas-oils	0.1	%	2	95%	Yes		AT8
						Temperature	14 °C to 17 °C							
						Pressure	0.05 MPa to 0.6 MPa							
						Pipe size	DN 20 - DN 80							
Volume of heat conveying flowing liquid (for thermal energy measurements)	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical output, various methods	6	180000	l/h	Liquid	water	0.05	%	2	95%	Yes		AT9
						Temperature	8 °C to 90 °C							
						Pressure	0.06 MPa to 0.5 MPa							
						Pipe size	DN 10 - 150							
Volume of heat conveying flowing liquid (for thermal energy measurements)	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical output, various methods	6	180000	l/h	Liquid	water	0.07	%	2	95%	Yes		AT9
						Temperature	> 90 °C to 130 °C							
						Pressure	0.06 MPa to 0.5 MPa							
						Pipe size	DN 10 - 150							

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Thermal energy (as a function of liquid flowrate volume and temperature difference)	Any type of calculator	Pulsed, electrical, digital and optical output, various methods	3	200	K	Liquid	water	< 0.20	%	2	95%	Yes		AT10
						Power	21 W to 40 MW							
Temperature difference (for thermal energy measurements)	Any type of temparature sensor pairs	Electrical, digital output, various methods	3	200	K	Liquid	water	< 20	mK	2	95%	No		AT11
						Temperature	-10 °C to 200 °C							
Thermal energy	Any type of heat meter	Pulsed, electrical, digital and optical output, various methods	20	40E+06	W	Liquid	water	< 1	%	2	95%	Yes		AT12
						Temperature	8 °C to 200 °C							
						Pipe size	DN 10 - 150							
Volume of liquid	Vessel	Gravimetric	5	1000	I	Liquid	water	0.005	%	2	95%	Yes		AT13
						Temperature	20 °C							
Volume of liquid	Vessel	Volumetric	100	30000	I	Liquid	water	0.02	%	2	95%	Yes		AT14
						Temperature	20 °C							
Volume of liquid	Storage tanks	Volumetric	1	1000	m³	Liquid	water	0.3	%	2	95%	Yes		AT15
						Temperature	20 °C							
Volume of liquid	Storage tanks	Optical reference line	1000	130000	m³	Liquid	water	0.25 to 0.40	%	2	95%	Yes		AT16
						Temperature	20 °C							

## Calibration and Measurement Capabilities

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty						
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Comments	NMI Service Identifier
Volume of liquid	One mark volumetric flasks	Gravimetric	1	250	ml	Liquid	water	0.1 to 0.03	%	2	95%	Yes		AT17
						Temperature	20 °C							
Volume of liquid	One mark volumetric flasks	Gravimetric	250	1000	ml	Liquid	water	0.03 to 0.01	%	2	95%	Yes		AT18
						Temperature	20 °C							
Volume of liquid	One mark volumetric flasks	Gravimetric	1	10	l	Liquid	water	0.01	%	2	95%	Yes		AT19
						Temperature	20 °C							
Volume of liquid	Measuring cylinders	Gravimetric	5	100	ml	Liquid	water	0.03 to 0.01	%	2	95%	Yes		AT20
						Temperature	20 °C							
Volume of liquid	Measuring cylinders	Gravimetric	100	500	ml	Liquid	water	0.01	%	2	95%	Yes		AT21
						Temperature	20 °C							
Volume of liquid	Burettes	Gravimetric	1	50	ml	Liquid	water	0.15 to 0.03	%	2	95%	Yes		AT22
						Temperature	20 °C							
Volume of liquid	Burettes	Gravimetric	50	500	ml	Liquid	water	0.03 to 0.01	%	2	95%	Yes		AT23
						Temperature	20 °C							
Volume of liquid	Pipettes	Gravimetric	1	1000	µl	Liquid	mercury	2.5 to 0.15	%	2	95%	Yes		AT24
						Temperature	20 °C							
Volume of liquid	Pipettes	Gravimetric	1	100	ml	Liquid	water	0.15 to 0.01	%	2	95%	Yes		AT25
						Temperature	20 °C							
Volume of liquid	Pipettes	Gravimetric	100	2000	ml	Liquid	water	0.01	%	2	95%	Yes		AT26
						Temperature	20 °C							